"NRCS Technology News" ~ September 2002

United States Department of Agriculture
Natural Resources Conservation Service
Science and Technology

"NRCS *Technology News*" is an electronic information piece provided by Science and Technology 10 times a year. It is designed to deliver pertinent information to our customers about new technology, products, and services available from the Soil Survey and Resource Assessment and the Science and Technology deputy areas. **"NRCS *Technology News*"** is in a format that is available to all NRCS field staff.

Features in this issue include:

MESSAGE FROM THE DEPUTY CHIEFS

Lawrence E. Clark and Maurice J. Mausbach

An interdisciplinary team of natural resource, remote sensing, and program managers and specialists met on July 10-11, 2002, in Beltsville, Maryland, to review and discuss the potential uses of remote sensing technologies in support of other NRCS conservation

programs. Employing the use of remote sensing technologies by purchasing high quality photography/imagery and using automated data collection processes by experienced resource inventory specialists trained in remote sensing have improved staff efficiencies, productivity, and quality of National Resources Inventory (NRI) data collection at a reduced cost. It is believed the same type of high quality photography/imagery and remote sensing techniques being used for the NRI can also be used to gain staff efficiencies and reduce costs in other conservation programs.

A primary purpose for evaluating how remote sensing technologies may benefit other conservation programs would be to concurrently reduce the workload burden of field office staffs and solidify a remote sensing support infrastructure. The Farm Security and Rural Investment Act of 2002 imposes a higher level of responsibility onto NRCS to monitor contracts and assess land and natural resource concerns, such as WRP easements, EQIP status reviews, and crop residue management and tillage surveys. Currently, monitoring activity is labor intensive and primarily done onsite by field level employees, with limited use of remote sensing technology. The projected NRCS monitoring/review workload for FY 2003 is expected to overwhelm field employees without some process changes. It includes approximately 960,000 WRP acres and 1.2 million WHIP acres.

The team is recommending that two compliance related program activities be pilot tested in FY 2003 using remote sensing. These include monitoring WRP easements and WHIP sites using NRI-like photography/imagery and remote sensing interpretation techniques. The pilot tests would be conducted at 4 or 5 Inventory Collection and Coordination Sites (ICCS) in different parts of the country. At the conclusion of the pilot study, a report containing findings and recommendations will be provided to leadership. The states involved with the pilot will be tasked to evaluate the project with coordination from Headquarters. If necessary, an independent assessment of the pilot may also be conducted (e.g. Oversight and Evaluation Team).

The pilot test will compare the use of remote sensing techniques to present on-site monitoring techniques. A few of the desired outcomes and deliverables of the pilot test are: (1) determine if the use of remote sensing will replace the need to make onsite visits for all WRP sites. On-site visits will only be needed for those sites having compliance violations; (2) determine if remote sensing can be used effectively as a screening tool to provide a total image of the project area in order to reveal potential problems, violations, or encroachments and achieve an accuracy level that will enable Agency personnel to better use onsite review time; (3) determine if remote sensing can reduce the workload burden of field/state office staff when conducting monitoring activities for various conservation programs; (4) determine if remote sensing imagery and related geospatial data can be used to establish a permanent base for current and future monitoring and; (5) determine how well resource inventory specialists unfamiliar with local land characteristics can detect and monitor easements from a centralized ICCS office.

TO TOP

CONSERVATIONIST'S CORNER
Thomas E. Jewett, State Conservationist, North Dakota

The Three Affiliated Tribes, an American Indian tribe in north-central North Dakota, owns a 16,000-acre ranch in the Badlands and Little Missouri River Basin. A major goal for the Tribes was to make their ranch a viable elk/buffalo ranch, capitalizing on the rugged scenic beauty of the area for recreation, tourism, and hunting. We enlisted the assistance of the Grazing Lands Technology Institute (GLTI) to provide recommendations to the Tribes on enterprise diversification. By having on-site visits by GLTI staff and discussions with tribal leaders and ranch managers, we were able to provide a template for the Tribes to follow that conserves the natural resources and provides economic sustainability.

The GLTI staff has provided quality assistance to North Dakota on such items as Nutritional Balance Analyzer (two statewide training sessions), Ecological Site Description development, and ranch enterprise diversification. This has included direct, on site assistance and training to ranchers and NRCS field office personnel, as well as personnel from other State (ND Extension Service, ND Department of Health, ND Land Department, and NDSU Agricultural Research) and Federal agencies (Agricultural Research Service and Bureau of Indian Affairs). This training and assistance has greatly improved the technical abilities of NRCS field office staffs for working with ranchers on issues, such as grazing land animal nutrition, how grazing management affects animal nutrition, and how grazing lands may be used to produce additional income to improve economic stability.

The NRCS Wetlands Science Institute (WSI) provided assistance from staff and funding for an interagency effort to adapt the Floristic Quality Assessment (FQA) approach in the Dakotas, excluding the Black Hills. FQA is a method of evaluating the quality of plant communities. This method will most likely be incorporated into future revisions of HydroGeoMorphic (HGM) wetland assessment models. Applicable to all sites; i.e., upland prairie, wetland, and forest, FQA could be used for determining mitigation needs or evaluating changes in plant communities.

North Dakota has an active Wetlands Reserve Program (WRP) even though State law limits the duration of any wetland easement to 30 years. The Prairie Pothole Region is important waterfowl habitat, and use of the depressional wetland HGM model, developed in part by the WSI, has improved our wetland restoration. It is much easier now to assess the weakest functions in the wetland and then create the plan to address that component. One member of the North Dakota staff is a member of the Wetland Restoration Training Instructor Cadre. Wetland delineation is an extremely important issue in the State and Prairie Pothole Region. The Wildlife Habitat Management Institute products have been used to guide the management aspect of the WRP conservation plans. WSI products have been used to improve the training for and application of this service to farmers.

Support of the soil conservation districts is important to the mission of our Agency in North Dakota. The State turned to the Social Sciences Institute for assistance. Their staff provided invaluable guidance in developing a procedure to assess the NRCS contribution of resources that supports the conservation district programs. NRCS can now be even more efficient in directing its resources in North Dakota.

TO TOP

NEW PRODUCTS AND SERVICES

#1 Ground Penetrating Radar Soil Suitability Map of the Conterminous U.S. Developed

"A Ground Penetrating Radar (GPR) Soil Suitability Map of the Conterminous United States" has been developed and presented at two recent technical meetings by National Soil Survey Center staff. The paper and poster describe the map development methodology and identify soil landscapes for the conterminous United States where GPR applications involving the upper meter of soil are likely to be successful. The map is based on field experience and soil attribute data contained in the State Soil Geographic (STATSGO) and the Soil Survey Geographic (SSURGO) databases. It is designed to provide field investigators with a broad overview of the dominant soil properties that affect radar signal attenuation and depth of penetration, and the relative effectiveness of GPR applications within broadly defined areas. A more detailed county example is also provided.

James Doolittle, research soil scientist, presented the poster and gave a keynote presentation on this work at the Ninth International Conference on Ground Penetrating Radar held in California. Many academics, geophysicists, geophysical consultants, and engineers attending expressed interest in the map. Geophysical scientists from the United States Geological Survey inquired if the Soil Survey Division could develop a map for the upper 2 meters of the soil. Specialists from the Federal Bureau of Investigation and Department of Defense expressed interest related to forensic and unexploded ordnance applications. Based on recommendations from this meeting, additional work was added for detailed mapping. A second poster was developed and presented at the 2002 International ESRI (Environmental Systems Research Institute or ArcInfo) User Conference, where it was awarded a blue ribbon in the “Best Cartographic Design - Single Map Product” category. The poster will be published in the 2003 ESRI Map Book. The final manuscript has been submitted for publication in a GPR 2002 Special Journal Issue.

The posters can be viewed at on the National Soil Survey Center Web site http://www.statlab.iastate.edu/soils/nssc/posters/index.htm#, choose Soil Geophysics, or the 2002 ESRI Map Library Web site http://gallery.dcse.com/map_library/, use “search” for Map ID 20075.

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TO TOP

#2 "Understanding Community Power Structures" Fact Sheet Available

Whether the community is a watershed, town, or other geographic or geopolitical boundary, locally led conservation initiatives can be implemented and maintained more effectively when community power structures are identified and understood. "Understanding Community Power Structures," a fact sheet in the Social Sciences Institute's People, Partnerships, and Communities (PPC) series, provides information to identify and understand community power structures. Rather than power being a "dirty" word, shared power to affect the community decisionmaking process and use of resources can be a sustainable and effective approach for citizens and civic leaders to implement measurable change in their community. The fact sheet identifies sources of community power, describes a variety of power structures – both formal and informal, and summarizes the steps to take when assessing power structures and identifying key leaders.

"Understanding Community Power Structures" is available in Word from the Social Sciences Institute Web site http://www.ssi.nrcs.usda.gov . A formatted version will be available at the Web site later in September.

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TO TOP

TECHNOLOGICAL ADVANCES

#3 Animal Waste Management Software Version 2 Released

A revised version of the Animal Waste Management (AWM) computer program has been released for installation on CCE (Common Computer Environment) machines and for public use. AWM is a planning and design tool for animal feeding operations used to estimate the production of manure, bedding, and process water and to determine the size

of storage/treatment facilities. The procedures and calculations used in AWM are based on the USDA-NRCS Agricultural Waste Management Field Handbook. The AWM computer program is an excellent tool for developing alternative facility designs for element I of Comprehensive Nutrient Management Plans.

The new version of AWM incorporates many enhancements requested by NRCS employees, Soil and Water Conservation District employees, and private users. Enhancements include: (1) Users may select from different sources of animal production data to be used by the AWM program for generating design volumes. NRCS and Midwest Plan Service data sources are included with the program. (2) A validation database has been incorporated into the program that warns the user of possible input errors by turning the background color of the input cell red. (3) Mixed animal types can be entered instead of being able to select only one farm type. (4) The 30-day runoff curve number can be entered for pervious runoff areas, or the program can generate it by entering the 1-day runoff number. (5) An option is available to design a compacted soil liner for storage ponds and anaerobic lagoons. (6) An option is available to design parallel or perpendicular ramps for storage ponds and rectangular tanks. (7) An option is available that allows the use of the Rational Design Method for anaerobic lagoon design. (8) A pop-up conversion calculator is available on all screens for converting units and making simple math calculations. (9) Concepts from the Manure Master program have been incorporated into the AWM program, allowing the user to compute a simple nutrient balance. (10) Standard or user-customized reports can be previewed, printed, or exported to a Microsoft Word file. (11) Help files in the program have been improved, and several computation errors discovered in the original program have been corrected. (12) Climatic data for all States have been revised to include evaporation data.

The new version of the AWM computer program is available for download from the http://www.wcc.nrcs.usda.gov/water/quality/common/wastemgmt/awm.html Web site. Updated climate data for each State and a new user guide is also available for downloading from this Web site.

If you have any questions or training needs concerning the AWM program, please contact:
Bruce Wilson (contact information below), William Boyd at (501) 210-8917/ William.Boyd@ar.usda.gov, or Dave Moffitt at (817) 509-3315/ dmoffitt@ftw.nrcs.usda.gov.

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TO TOP

#4 'Lana' Vetch Controls Medusahead in California

Medusahead is an aggressive annual weed that can crowd out desirable plants and reduce grazing capacity on semi-arid rangeland. A Plant Materials selection, 'Lana' woollypod vetch, was studied recently to determine its effectiveness in controlling medusahead. 'Lana' is a self-seeding annual winter legume. Study results are that, where it is well adapted, 'Lana' controls medusahead when broadcast seeded at a rate of 20 pounds pure live seed per acre. Successful plantings require annual application of phosphate fertilizer to maintain an acceptable level of vetch ground cover.

The study was conducted by the Plant Materials Center in Lockeford, California, in cooperation with NRCS offices at Red Bluff and Jackson, East Bay Municipal Utility District, and Camanche Hills Hunting Preserve. More details of the study are in California Plant Materials Technical Note 65, which is available from the national Plant Materials Program Web site http://Plant-Materials.nrcs.usda.gov. Select "Publications" from the main menu, select "Lockeford PMC," and select "Technical Notes." "Vegetative Control of Medusahead" is TN-65, (ID# 499).

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TO TOP

TECHNOLOGY TRANSFER

#5 Hydrophobic Soils Fact Sheet Addresses Wildfire Recovery

"Hydrophobicity" is a Soil Quality Information Sheet about hydrophobic soil – soil that is water repellant. With the severity of this year's fire season, hydrophobic soils are likely to be an extensive problem. During some very hot fires, waxy substances are produced from plant material; the waxes penetrate the soil as a gas, and then coat soil particles as they cool. Where these water repellent layers form, infiltration can be reduced for up to a year or more. This hampers the reestablishment of vegetation and soil biological activity, and can lead to serious erosion and sedimentation problems.

To learn more about how these layers form and how to treat them, read "Hydrophobicity," available at http://www.statlab.iastate.edu/survey/SQI/sqiinfo.html.

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TO TOP

#6 SNOTEL Provides Early Warning of Record Low Rio Grande Runoff

SNOTEL (SNOw TELemetry) data and water supply forecasts are critical in assessing drought risk and play a key role qualifying agricultural interests for disaster relief during periods of climate extremes, both drought and flood. The exceptional droughts in the Pacific Northwest in 2001 and in the Southwest in 2002 were mitigated by using the daily SNOTEL data.

Each January, NRCS National Water and Climate Center (NWCC) water supply forecast hydrologists make monthly predictions of how much streamflow can be expected from the mountain snowpack that year. The basic statistical methods used to create these forecasts were developed during the 1960's; however acquiring the timely snowpack and precipitation data required for forecasting was limited to once or twice per month. Rapid changes in snowpack conditions were not captured until a monthly measurement was made by snow surveyors. With the installation of the automated SNOTEL network during the early 1980's, water supply forecasters now have access to the daily data necessary to track snowpack and precipitation year round, providing mid-month or weekly forecasts as conditions warrant. Updated statistical water supply forecast procedures have been implemented that take advantage of daily SNOTEL data.

The Rio Grande near Del Norte, Colorado, is one of the critical forecast points for assessing drought impacts. Since 1890, United States Geological Survey records reveal a Del Norte record high April to September runoff of 907,600 acre-feet in 1987 and a record low of 155,700 acre-feet in 1977. On January 1, 2002, the April to September water supply forecast was 340,000 acre-feet, 64 percent of average and only double the 1977 historic low. This forecast caught the attention of many Southwest water users and resulted in increased monitoring.

By late spring 2002, the Upper Rio Grande Basin in Colorado had received only 42 percent of its average precipitation since October 1, 2001. At the NRCS Wolf Creek Summit data collection (SNOTEL) site at 11,000 feet, six-tenths of an inch of precipitation was recorded between March 28 and June 1; when 12 inches normally occurs during that period. Additionally, on May 1 the Wolf Creek Summit snow water content was 10.5 inches, which broke the previous minimum record of 11.7 inches set in 1977. Finally, warm temperatures then melted the snowpack a full 2 months earlier than normal. The final June 1 water supply forecast for April through September was 90,000 acre-feet, only 17 percent of the 533,240 acre-feet that is average for this period and 58 percent of the previous record minimum. The measured Del Norte streamflow on June

21 was 143 cubic feet per second, compared to an average flow on this date of 2,958 cubic feet per second. These extreme conditions prompted one southern Colorado water manager to say, "This is so incredible that I have to slap myself once in awhile to insure that it isn't a dream!"

Although the economic impact of such a drought is immense, the advance warning provided by the NRCS Snow Survey and Water Supply Forecasting Program, in cooperation with the National Weather Service (NWS), allows farmers, ranchers, and water managers to avoid even greater losses. Data from the SNOTEL system and water supply forecasts are available in near real-time from the NWCC homepage at http://www.wcc.nrcs.usda.gov. Drought information is available from the following homepage http://www.drought.unl.edu/dm/monitor.html.

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TO TOP

#7 Toll Free Number Available for Social Sciences Institute Product Orders

Print copies of products from the Social Sciences Institute (SSI) are now available from a toll free number. Call 1-888-526-3227 and select extension 2 to order "USDA NRCS Publications." Leave your name, contact information, and the name of the publication(s) you are requesting. This toll free number does not serve requests for "The Leader in You" tapes or for the locally led conservation products associated with the "Developing Your Skills to INVOLVE COMMUNITIES in Implementing Locally Led Conservation." These products are available from Barbara Wallace at the SSI's Grand Rapids office at (616) 942-1503 or ssinter2@po.nrcs.usda.gov. SSI products are also available from the Web site http://www.ssi.nrcs.usda.gov. The Product Catalog may be viewed at the Web site or ordered from 1-888-526-3227.

The SSI integrates customer opinion and field work with science-based analysis to develop tools to assist The Conservation Partnership with the "people aspects" of conservation work - applying the social and economic aspects of human behavior to natural resource conservation programs, policies, and activities.
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TO TOP

#8 Trees Planted for Odor Management

Odors from animal facilities often cause complaints from nearby neighbors, even in a rural setting. NRCS Connecticut has developed their first conservation plan that uses tree planting between an animal waste storage pit and a neighboring residence to control odor from the pit. Using emerging technology in shelterbelts and animal waste odor control provided by the NRCS Air Quality Cooperating Scientists and the USDA Agroforestry Center, conservationists are working with landowners to plant rows of spruce trees on the predominant downwind side of the storage pit. The trees will reduce the downwind odor by intercepting many of the odor causing contaminants, including volatile organic compounds (VOCs) and particulate matter, and induce mixing of the atmospheric boundary layer through turbulent transfer. They will also provide a view more aesthetically pleasing than one of a pit full of manure, reducing the tendency of people nearby to smell with their eyes.

The NRCS RC&D coordinator for eastern Connecticut is working with NRCS air quality scientists to include air quality concerns into the NRCS planning and reporting system. This work contributes toward the recognition of air quality as an important resource, and it highlights the NRCS role in good things that can be done to manage air quality.

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TO TOP

TRAINING

#9 Conservation Buffers Training can be Tailored to State Needs

A Conservation Buffers training course has been developed by the National Conservation Buffers Initiative teams in conjunction with the National Employee Development Center, Watershed Science Institute, Wildlife Habitat Management Institute, National

Agroforestry Center, and others. The pilot session was conducted at the Lied "Arbor Day" Center in Nebraska City, Nebraska. NRCS conservationists from across the U.S. participated in a 2-1/2 day course that included field and classroom instruction in the planning, design, and maintenance of conservation buffers.

FY 2002 sessions in Oregon and Mississippi will consist of the topics alley cropping, contour buffer strips, cross wind trap strips, field border, filter strip, grassed waterway, herbaceous wind barriers, riparian forest buffer, vegetative barrier, and windbreak/shelterbelt buffer training. Next year, courses will be offered in South Dakota, New Mexico, Pennsylvania, and other locations. States have the option to tailor the course to focus on specific practices, add extra field time, and have up to 50 NRCS and/or partner students from their field locations.

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TO TOP

NRCS TECHNOLOGY NEWS

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